

**MARK SCHEME for the May/June 2011 question paper  
for the guidance of teachers**

**0610 BIOLOGY**

**0610/21**

Paper 2 (Core Theory), maximum raw mark 80

Mark schemes must be read in conjunction with the question papers and the report on the examination.

- Cambridge will not enter into discussions or correspondence in connection with these mark schemes.

Cambridge is publishing the mark schemes for the May/June 2011 question papers for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level syllabuses and some Ordinary Level syllabuses.



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## General notes

Do not exceed the section sub-totals or question maxima.

Symbols used in mark scheme and guidance notes.

/ separates alternatives for a marking point

; separates points for the award of a mark

MP mark point – used in guidance notes when referring to numbered marking points

ORA or reverse argument / reasoning

OWTTE or words to that effect

A accept – as a correct response

R reject – this is marked with a cross and any following correct statements do not gain any marks

I ignore / irrelevant / inadequate – this response gains no mark, but any following correct answers can gain marks.

( ) the word / phrase in brackets is not required to gain marks but sets the context of the response for credit.  
e.g. (waxy) cuticle. Waxy not needed but if it was described as a cellulose cuticle then no mark is awarded.

mitosis underlined words – this word only

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1												<p><b>note</b> – no mark for cat A</p> <p>I – all ticks and crosses in the grid</p> <p>A – if generic name letter missing credit species name alone</p> <p>R – if wrong generic name letter given</p> <p>I – common names such as lion, tiger etc.</p>
cat	1a	1b	2a	2b	3a	3b	4a	4b	5a	5b	cat family member	
<b>A</b>											<i>L. caracal</i>	
<b>B</b>											<i>A. jubatus;</i>	
<b>C</b>											<i>P. leo;</i>	
<b>D</b>											<i>N. nebulosa;</i>	
<b>E</b>											<i>L. rufus;</i>	
<b>F</b>											<i>P. tigris;</i>	
each correctly identified cat – 1 mark											[5]	[Total: 5]

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<p><b>2 (a) (i)</b> 1 a diet that contains all the necessary nutrients / OWTTE;  2 in the required quantities / OWTTE;  3 for sex / age / activity;  4 to maintain health / for healthy living;</p> <p>any three – 1 mark each [3]</p> <p><b>(ii)</b> two of – carbohydrates / protein / water; [1]</p> <p><b>(b) <u>too little fibre</u> –</b>  1 fibre aids peristalsis / aid movement through alimentary canal / OWTTE;  2 can lead to constipation;  3 associated with (colon) cancer;</p> <p>any two – 1 mark each [2]</p> <p><b><u>too much fat</u> –</b>  1 body stores (excess) fat;  2 can lead to obesity / overweight;  3 associated with coronary heart disease;  4 increase risk of diabetes</p> <p>any two – 1 mark each [2]</p> <p><b>(c)</b> 1 calcium used in bones / teeth;  2 strengthens / hardens bone / teeth / enamel;  3 lack leads to rickets (in bones);  4 bones lack rigidity / become bent / curved;  5 teeth more prone to disease / decay / cavities;  6 involved in clotting / OWTTE;  7 blood may not clot properly;</p> <p>any three – 1 mark each [3]</p> <p style="text-align: right;"><b>[Total: 11]</b></p>	<p>A – ref. to 7 nutrients, list of all 7 necessary nutrients  A – amount, not in excess</p> <p><b>note</b> – two responses for 1 mark.  A – starch / sugar as alternatives for carbohydrate</p> <p>I – ref. to diarrhoea</p> <p>A – other descriptions of overweight  A – specific correct ref. to symptoms e.g. heart attack, block arteries  I – heart problems as too vague</p>
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<p><b>3 (a)</b> <b>M</b> – <u>urethra</u>;  <b>N</b> – sperm duct / vas deferens;  <b>O</b> – <u>ureter</u>;</p> <p><u>testes</u> –  produce sperm / male gametes / sex cells;  produce / release testosterone;</p> <p><u>prostate gland</u> –  produces (part of) seminal fluid / semen / fluid that  activates / nourishes sperm / fluid for sperm to swim in;</p> <p><u>scrotum</u> –  supports / holds / contains testes (outside of body cavity) /  allows testes to stay below body temperature / cool;</p> <p><b>(b) (i)</b> <b>X</b> must be clearly linked to sperm duct;</p> <p><b>(ii)</b> condom;</p> <p>latex / rubber is impermeable (to body fluids / semen);</p> <p>prevents female body fluids coming in contact with male tissue  / male body fluids coming in contact with female tissue;</p> <p><b>(iii)</b> HIV / syphilis / gonorrhoea / (genital) herpes / NSU  chlamydia;</p> <p style="text-align: right;"><b>[Total: 11]</b></p>	<p>[3]</p> <p>[2] I – stores sperm  A – male hormone</p> <p>[1]</p> <p>[1]</p> <p>[1] R – X on urethra;  If more than 1 X on Fig, if any wrong – no mark</p> <p>[2] A – ref. to causative agent in lieu of body fluid  A – prevents contact / exchange of body fluids;  I – ref. to contraception</p> <p>[1] A – AIDS and any other valid example</p>
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<p><b>4 (a) (i)</b> <b>A</b> – sensory neurone;  <b>B</b> – motor neurone;  <b>C</b> – synapse;  <b>D</b> – relay neurone;</p> <p><b>(ii)</b> muscles;  glands;</p> <p><b>(b) (i)</b> response (to a stimulus) that is automatic / involuntary / OWTTE;  and rapid;</p> <p><b>(ii)</b> withdrawal reflex / knee jerk reflex / iris reflex;</p> <p style="text-align: right;"><b>[Total: 9]</b></p>	<p>A – nerve fibre, nerve</p> <p>[4] A – intermediate, internuncial, connector neurone</p> <p>A – in either order</p> <p>[2] I – specific examples</p> <p>A – ref. to a correct sequence of neurones <b>MAX 1</b></p> <p>A – descriptions of a reflex</p> <p>[1] A – any other valid reflex action</p>
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**5 (a) (i)** ovary / testis; [1] I – gonads, sex organs, gametes

**(ii)** ovary / anther; [1] I – gametes, ovum  
A – ovule / stamen / carpel

MP	differences	
	mitosis	meiosis
1	chromosome number stays the same / produces diploid nuclei	halves chromosome number / produces haploid nuclei;
2	forms body cells	forms gametes;
3	cells have paired chromosomes	cells have unpaired chromosomes;
4	no exchange of genetic material	can have exchange of genetic material;
5	forms two nuclei	forms four nuclei;
6	new nuclei genetically identical to original / one another	new nuclei genetically different to original / one another
7	comprises one division	comprises two divisions;

A – cells for nuclei

A – any other valid point

A – cells for nuclei

A – cells for nuclei

any three – 1 mark each [3]

**(b) (i)** change in gene / DNA; [2]  
change in the structure / number of chromosomes;

I – genetic material

**(ii)** 1 X rays;  
2 ultra violet light;  
3 ionising radiation;  
I – pollution, smoking,

4 (mutagenic) chemicals;  
A – alpha, beta, gamma rays, radioactivity, nuclear fallout  
I – radiation

any two – 1 mark each [2] A – any named mutagen, cigarette tar

**[Total: 9]**

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<p><b>6 (a) (i)</b> photosynthesis; [1]</p> <p><b>(ii)</b> chlorophyll; I – chloroplasts</p> <p><b>(iii)</b> 12 000 kJ;</p> <p><b>(iv)</b> bacteria; [2] fungi;</p> <p><b>(v)</b> 8000 / 100 000 × 100; [2] 8 (%);</p> <p><b>(vi)</b> 1 energy released / lost by respiration; 2 used in metabolism / chemical reactions; 3 used in body activities / movement / passage of impulses; 4 lost as heat (to the environment); 5 lost in excreta; 6 lost in decomposition at death; 7 not all of primary consumer is eaten;</p> <p>any three – 1 mark each [3]</p>	<p><b>note</b> – if correct answer given but no working then award both marks</p> <p>R – energy used in or for respiration</p> <p>e.g. digestion</p>
<p><b>(b)</b> group of organisms of one species; [2] living in same area and at the same time;</p>	
<p>[Total: 12]</p>	



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<p><b>7 (a) (i) D</b> – next to relevant arrow;</p> <p><b>(ii) P</b> – next to relevant arrow;</p> <p><b>(iii) R</b> – next to relevant arrow;</p> <p><b>(b)</b></p> <ol style="list-style-type: none"> <li>1 use of fossil fuels;</li> <li>2 because of increased energy demands;</li> <li>3 use of vehicles;</li> <li>4 less photosynthesis;</li> <li>5 because of deforestation / OWTTE;</li> <li>6 burning of trees / forests;</li> </ol> <p>any four – 1 mark each</p> <p style="text-align: right;"><b>[Total: 7]</b></p>	<p>[1] <b>note</b> – for any letter if it is written more than once on Fig. only award mark if all are correct</p> <p>Responses must be in context of increasing activities since 1850 to gain credit</p> <p>A – refs to industry, factories</p> <p>A – less carbon dioxide being used up</p> <p>A – decreased numbers of trees</p> <p>A – increased population (more respiration)</p> <p>A – any other valid point e.g. detail / explanation of one of the MPs</p>
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<b>8</b>	<b>(a) (i)</b> aorta and pulmonary vein(s);	[1]	<b>note</b> – two responses for 1 mark
	<b>(ii) P;</b>	[1]	
	<b>(iii) Q / R;</b>	[1]	A – Q and R
	<b>(b)</b> 1 contraction of muscles / wall; 2 of <u>left</u> ventricle; 3 increases pressure; 4 forces cuspid / bicuspid / S valve shut; 5 forces semi lunar / R valve open;		I – ref. to P I – ref. to Q
	any three – 1 mark each	[3]	
	<b>(c) (i)</b> coronary artery / vessels;		
	<b>(ii)</b> hepatic artery; hepatic portal vein;	[2]	A – in either order
	<b>[Total: 9]</b>		

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<p><b>9 (a)</b></p> <ol style="list-style-type: none"> <li>1 evaporation of water from leaf / stem / plant;</li> <li>2 diffusion of water vapour;</li> <li>3 through stomata;</li> <li>4 down concentration gradient;</li> </ol> <p>any three – 1 mark each</p> <p style="text-align: right;">[3]</p> <p><b>(b)</b></p> <ol style="list-style-type: none"> <li>1 temperature rise increases the rate of transpiration / evaporation / ORA;</li> <li>2 warm air can contain more water (vapour) / ORA;</li> <li>3 increases concentration gradient / ORA;</li> </ol> <ol style="list-style-type: none"> <li>1 increasing light increases the rate of transpiration / ORA;</li> <li>2 increasing light stomata open further / ORA;</li> <li>3 allows more diffusion / ORA;</li> </ol> <ol style="list-style-type: none"> <li>1 decreasing humidity increases the rate of transpiration / evaporation / ORA;</li> <li>2 drier air increases concentration gradient / ORA;</li> <li>3 more water vapour lost / ORA;</li> </ol> <ol style="list-style-type: none"> <li>1 increasing wind speed increases the rate of transpiration / ORA;</li> <li>2 more air movement removes saturated air / ORA;</li> <li>3 away from stomata / (leaf) surface;</li> </ol> <p>any two factors – 2 marks max each</p> <p style="text-align: right;">[4]</p> <p style="text-align: right;"><b>[Total: 7]</b></p>	<p>No credit for effects of transpiration</p> <p>I – ref. to mineral salts</p> <p>A – from high concentration to lower concentration (of water), down water potential gradient</p> <p>Read response as two separate paragraphs. Responses may include factor in description. No credit for naming factor.</p> <p>I – ref. to time of day</p>
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